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McGuire, B.; Lucas, D. N.

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Editorial

Planning the obstetric airway

B. McGuire¹ and **D. N. Lucas²**¹ Consultant, Department of Anaesthesia, Ninewells Hospital Dundee, UK² Consultant, Department of Anaesthesia, Northwick Park Hospital, Middlesex, UK

Correspondence to: B. McGuire

Email: b.mcguire@nhs.net

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Alongside the dramatic increase in caesarean section rates in the UK over the last 40 years, there has been a significant trend away from general anaesthesia, with neuraxial anaesthesia now the preferred mode. General anaesthesia, with the attendant risks of failed intubation, hypoxaemia and pulmonary aspiration, is infrequently performed and is a significant source of anxiety for anaesthetists working on the labour ward [1, 2]. In contrast to other areas of anaesthetic practice, obstetric general anaesthesia has been slow to evolve [3, 4].

A significant development in this area of practice came in 2015, with the publication of the Obstetric Anaesthetists' Association (OAA) and Difficult Airway Society (DAS) joint guidelines on the management of the unpredicted difficult airway in obstetric patients [5]. These guidelines included three algorithms to support practice in: planning airway management in obstetrics; acute management of failed intubation; and management of a 'can't intubate, can't oxygenate' scenario. However, the issue of the predicted difficult airway in obstetrics was deliberately not tackled in these guidelines.

In this issue of *Anaesthesia*, Mushambi et al. address this subject and offer guidance on how to manage such patients [6]. This document, produced outside the OAA and DAS guidelines processes, is not a guideline per se, but instead a series of practice recommendations and algorithmic decision aids, based on an extensive literature review. This aims to offer a consistent approach to identifying and managing the pregnant woman with an at-risk airway. Such guidance is welcomed but will only be beneficial if readers are convinced of its validity and practicality. Historically, airway guidelines have been criticised for being based on low-quality evidence,

having variable clinical uptake and failing to demonstrate a causal relationship between guideline adherence and outcome [7].

Quality of evidence

The evidence presented is in the form of case reports, covering almost 40 years, describing the management of difficult obstetric airways in terms of approach – neuraxial anaesthesia or general anaesthesia with advanced airway techniques. This is low-level evidence by any classification but is all that is currently available. In the UK, a case series such as this is level-4 Oxford Centre for Evidence-based Medicine level of evidence. It will be debatable whether this evidence is sufficient to justify recommendations for practice, even when coupled with the known expertise of the authors. Certainly, demonstration of a causal relationship between following the recommendations and clinical outcomes appears challenging. The authors have chosen not to match their recommendations to a graded level of evidence.

The pattern of publication of the included case reports is notable, with an almost equal number having been published between 2010 and 2019 as between the years 1980 and 2009. We respect the desire of the authors to provide an exhaustive case series but would question the relevance of some of the more historical data. Both obstetric and anaesthetic management have evolved hugely since 1981, and in particular, the progress of advanced airway techniques and devices. Management strategies that were undertaken in the 1980s and 1990s, at a time when supraglottic airways were regarded as novel devices and videolaryngoscopes were but a distant dream, are now of limited relevance.

Many different techniques have been reported for the management of the challenging obstetric airway. These include those performed awake and those after the induction of general anaesthesia. A wide variety of rigid and flexible indirect laryngoscopy techniques have been employed, as have emergency and elective tracheostomy. A lack of consistency of approach reflects differing skill sets and preferences within individuals and departments, arguably justifying the need for guidance on a consistent approach in such scenarios. However, could such variability in practice simply reflect the management of the predicted difficult airway in all patients, not just those who are pregnant? Furthermore, the heterogeneity of the data makes its translation to the formulation of a guideline extremely difficult. There is insufficient information on individual cases to evaluate the relative success or failure of a particular technique. The authors of the fourth National Audit Project on serious complications of airway management assessed the quality of the airway management in their reported cases [8], a process that could not happen here with the methodology employed. The published cases in this series mostly present successful outcomes and not complications.

Learning points

However, the authors do reflect on what lessons we can learn regarding effective approaches to the challenging obstetric airway. Airway assessment is likely to be of benefit as it starts the process of antenatal airway planning, but we know how our assessment tools do not serve us well in predicting difficulty [9]. Multidisciplinary discussion and strategy agreement involving anaesthetists, with regard to when and how to facilitate safe delivery, will promote best practice in airway management. In terms of airway techniques, videolaryngoscopy after induction of general anaesthesia may become commonplace and probably first line in obstetric general anaesthesia, but the term covers a gamut of devices and techniques, making a recommended approach difficult. Choice of Macintosh or hyperangulated blades, and channelled or non-channelled devices are currently more influenced by local factors rather than published evidence. Videolaryngoscopy may have a high success rate in the obstetric population, both when used as the primary device and when required as a rescue device following failed Macintosh intubation [10]. The recently published Difficult Airway Society guidelines for awake tracheal intubation in adults recommend that awake tracheal intubation must be considered in the presence of predictors of difficult airway management [11]. Awake videolaryngoscopy is likely to increase in popularity,

perhaps to the detriment of awake flexible bronchoscopic intubation, which we know takes time when delays can be critical [12] and requires rehearsed proficiency that may not always be available [13]. The challenges for obstetric anaesthesia are firstly, to ensure that those who need to use videolaryngoscopy are suitably trained and, secondly, to identify which videolaryngoscope devices are most effective in the obstetric population. This need is highlighted by the finding that one third of reported cases in this review did not reach their planned date for delivery and urgent contingency plans had to be implemented. This aspect, the unpredictability of labour and delivery, may be a weakness of the suggested algorithms.

The role of high-flow nasal humidified oxygenation as a peri-intubation technique in obstetrics has yet to be defined. Studies evaluating the impact of high-flow nasal humidified oxygenation in obstetric patients found that it did not confer an advantage in pre-oxygenation, and performed worse than standard face mask techniques [14, 15]. In these studies, the success of pre-oxygenation was assessed using end-tidal oxygen concentration as the primary outcome, and no patients received general anaesthesia. Currently, there are no clinical studies looking at the time to desaturation in the obstetric patient having general anaesthesia. However, in a computational model, the positive effect on oxygen saturation of increasing oxygen concentration at the open glottis during apnoea in the term parturient has been demonstrated [16]. This, coupled with numerous case reports and work in the non-obstetric population, would strongly imply that high-flow nasal humidified oxygenation has an important role in maintaining oxygenation in the apnoeic period during obstetric general anaesthesia [17]. Research in this patient group is fraught with difficulties, but evidence is required to answer this question. However, work on this topic is ongoing (Personal communication with R Hofmeyr).

Airway rescue techniques also need to be considered. Pre-emptive neck ultrasound and marking of the cricothyroid membrane in cases of predicted difficulty have a role to play [18], and the high efficacy of supraglottic airway devices in airway rescue must not be forgotten [8]. Mushambi's paper is less about airway management per se but highlights the need for evidence on the relative success of devices, approaches and techniques to truly inform clinical practice in obstetric anaesthesia. This will require prospective research or 'big data' retrospective collections.

Planning delivery

Arguably, the most controversial aspect of the recommendations in this paper surrounds the advice that

planning during pregnancy should take account of the airway skills and equipment available out-of-hours and that, when these cannot be guaranteed, an elective caesarean section is advised. Regarding the 'requisite advanced airway equipment' referred to in Fig. 2 of the guidelines by Mushambi et al. [6], this predominantly describes videolaryngoscopes, flexible bronchoscopes and equipment for front-of-neck access. Despite the unanswered questions about videolaryngoscopy, we believe these devices should be mandatory equipment for any obstetric theatre. Furthermore, the issue of availability of the 'appropriate skills for the airway plan' raises an interesting point about clinical practice within our specialty. As sub-specialisation in anaesthesia has progressed, airway specialists have emerged. The Difficult Airway Society has been pivotal in developing standardised approaches to airway management in a variety of clinical situations. Part of this ethos centres around maintaining a set of skills that encompasses the ability to manage difficult tracheal intubation, requisite for all anaesthetists. The decision to undertake an elective caesarean section 'for airway indication' in a woman where there is no obstetric or fetal indication is, in our view, contentious. We would suggest that, in all but the most extreme cases, anaesthetic or airway reasons should not routinely be an indication for elective caesarean section. We acknowledge that this requires departments to ensure the presence of the appropriate equipment and skill provision to deliver advanced airway management at the time of need.

The presumption that an elective caesarean section undertaken with neuraxial anaesthesia will avoid the risks of general anaesthesia and airway control is erroneous, as demonstrated by several cases in Mushambi et al.'s literature review where general anaesthesia had to be undertaken when the neuraxial technique failed. Similarly, half of the obstetric cases described in NAP4 occurred when general anaesthesia was administered after an inadequate neuraxial technique [8]. An analogous clinical situation to planning delivery for a woman with an anticipated difficult airway might be a woman with an elevated body mass index (BMI). A UK national cohort study compared outcomes in pregnant women with BMI $\geq 50 \text{ kg.m}^{-2}$ between those who planned to deliver vaginally and those who planned to deliver by caesarean section [19]. The authors of this study found there were no significant differences in anaesthetic, postnatal or neonatal complications between the two groups, with the exception of shoulder dystocia. It could be argued that a department that cannot provide out-of-hours advanced airway management in obstetrics should consider the transfer of such cases to another unit, rather than offering elective caesarean section.

The paper emphasises the important role of neuraxial analgesia in the care of a woman with an anticipated difficult airway. An oft-cited advantage of labour epidural analgesia is the ability to convert reliably to an anaesthetic block, should caesarean section be required. The authors highlight that there is evidence that the reliability of epidural analgesia is enhanced when a combined spinal-epidural approach is used. One of the most critical indicators of an effective epidural, apart from analgesia, is the absence of a requirement for clinician intervention with additional top-ups. Our final point is to stress that labour epidurals must be actively reviewed, particularly in a patient with an anticipated difficult airway, and managed with early recourse to resiting if concern exists about a lack of efficacy.

In summary, this paper tackles an important issue and should be commended. While some may have reservations on the evidence base used in making their recommendations, others will find such recommendations extremely informative. Expert opinion on retrospective data is the basis for most published airway guidelines and, although not considered to be a high level of evidence, should not be ignored. These recommendations may raise further debate on the matter, but it seems highly unlikely that future authors will produce guidance with stronger evidence, at least not until prospective national data in obstetric anaesthesia are collected, along the lines of the Royal College of Anaesthetists National Audit Projects.

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